

CRYSTAL OSCILLATOR (Programmable)
SPREAD SPECTRUM
OUTPUT: CMOS



Product Number
SG-9101CA: X1G005301xxxx00
SG-9101CB: X1G005311xxxx00
SG-9101CE: X1G005321xxxx00
SG-9101CG: X1G005291xxxx00

SG-9101 series

- Frequency range : 0.67 MHz to 170 MHz (1 ppm Step)
- Supply voltage : 1.62 V to 3.63 V
- Function : Output enable (OE) or Standby (\overline{ST})
- Configurable spread spectrum settings:
2 kinds of spread type, 6 kinds of spread width
4 kinds of modulation frequency, 3 kinds of spread profile
- PLL technology to enable short lead time
- Available field oscillator programmer "SG-Writer II"



Specifications (characteristics)

Item	Symbol	Specifications				Conditions/Remarks																																														
Supply voltage	V_{CC}	1.80 V Typ.		2.50 V Typ.	3.30 V Typ.	-																																														
		1.62 V to 1.98 V	1.98 V to 2.20 V	2.20 V to 2.80 V	2.70 V to 3.63 V																																															
Output frequency range	f_o	0.67 MHz to 170 MHz																																																		
Storage temperature	T_{stg}	-40 °C to +125 °C				Storage as single product.																																														
Operating temperature	T_{use}	-40 °C to +85 °C																																																		
		-40 °C to +105 °C																																																		
Frequency tolerance ^{*1}	f_{tol}	$\pm 50 \times 10^{-6}$				Average frequency of 1s gate time.																																														
Current consumption	I_{CC}	3.4 mA Max.	3.5 mA Max.	3.6 mA Max.	3.7 mA Max.	$T_{use} = +105 \text{ °C}$	No load, $f_o = 20 \text{ MHz}$																																													
		2.9 mA Typ.		3.0 mA Typ.	3.2 mA Typ.	$T_{use} = +25 \text{ °C}$																																														
		5.7 mA Max.	6.0 mA Max.	6.9 mA Max.	8.3 mA Max.	$T_{use} = +105 \text{ °C}$	No load, $f_o = 170 \text{ MHz}$																																													
		4.9 mA Typ.		5.9 mA Typ.	7.0 mA Typ.	$T_{use} = +25 \text{ °C}$																																														
Output disable current	I_{dis}	3.4 mA Max.	3.4 mA Max.	3.5 mA Max.	3.7 mA Max.	OE = GND, $f_o = 170 \text{ MHz}$																																														
Standby current	I_{std}	0.9 μA Max.	1.0 μA Max.	1.5 μA Max.	2.5 μA Max.	$T_{use} = +105 \text{ °C}$	$\overline{ST} = \text{GND}$																																													
		0.3 μA Typ.	0.4 μA Typ.	0.5 μA Typ.	1.1 μA Typ.	$T_{use} = +25 \text{ °C}$																																														
Symmetry	SYM	45 % to 55 %				50 % V_{CC} Level																																														
Output voltage (DC characteristics)	V_{OH}	90 % V_{CC} Min.				<table border="1"> <thead> <tr> <th colspan="2">I_{OH}/I_{OL} Conditions</th> <th colspan="4">[mA]</th> </tr> <tr> <th>Rise/Fall time</th> <th>V_{CC}</th> <th>*A</th> <th>*B</th> <th>*C</th> <th>*D</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Default ($f_o > 40 \text{ MHz}$), Fast</td> <td>I_{OH}</td> <td>-2.5</td> <td>-3.5</td> <td>-4.0</td> <td>-5.0</td> </tr> <tr> <td>I_{OL}</td> <td>2.5</td> <td>3.5</td> <td>4.0</td> <td>5.0</td> </tr> <tr> <td rowspan="2">Default ($f_o \leq 40 \text{ MHz}$)</td> <td>I_{OH}</td> <td>-1.5</td> <td>-2.0</td> <td>-2.5</td> <td>-3.0</td> </tr> <tr> <td>I_{OL}</td> <td>1.5</td> <td>2.0</td> <td>2.5</td> <td>3.0</td> </tr> <tr> <td rowspan="2">Slow</td> <td>I_{OH}</td> <td>-1.0</td> <td>-1.5</td> <td>-2.0</td> <td>-2.5</td> </tr> <tr> <td>I_{OL}</td> <td>1.0</td> <td>1.5</td> <td>2.0</td> <td>2.5</td> </tr> </tbody> </table>		I _{OH} /I _{OL} Conditions		[mA]				Rise/Fall time	V_{CC}	*A	*B	*C	*D	Default ($f_o > 40 \text{ MHz}$), Fast	I _{OH}	-2.5	-3.5	-4.0	-5.0	I _{OL}	2.5	3.5	4.0	5.0	Default ($f_o \leq 40 \text{ MHz}$)	I _{OH}	-1.5	-2.0	-2.5	-3.0	I _{OL}	1.5	2.0	2.5	3.0	Slow	I _{OH}	-1.0	-1.5	-2.0	-2.5	I _{OL}	1.0	1.5	2.0	2.5
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	I _{OL}	1.0	1.5	2.0	2.5																																															
V_{OL}	10 % V_{CC} Max.																																																			
Output load condition	L_{CMOS}	15 pF Max.				-																																														
Input voltage	V_{IH}	70 % V_{CC} Min.				OE or \overline{ST}																																														
	V_{IL}	30 % V_{CC} Max.																																																		
Rise time /Fall time	Default Fast Slow	$t_{r/tf}$	3.0 ns Max.		$f_o > 40 \text{ MHz}$		20 % - 80 % V_{CC} , $L_{CMOS} = 15 \text{ pF}$																																													
			6.0 ns Max.		$f_o \leq 40 \text{ MHz}$																																															
			3.0 ns Max.		$f_o = 0.67 \text{ MHz to } 170 \text{ MHz}$																																															
			10.0 ns Max.		$f_o = 0.67 \text{ MHz to } 20 \text{ MHz}$																																															
Output disable time (OE)	t_{stp_oe}	1 μs Max.				Measured from the time OE or \overline{ST} pin crosses 30 % V_{CC}																																														
Output disable time (ST)	t_{stp_st}	1 μs Max.				Measured from the time OE pin crosses 70 % V_{CC}																																														
Output enable time (OE)	t_{sta_oe}	1 μs Max.				Measured from the time OE pin crosses 70 % V_{CC}																																														
Output enable time (ST)	t_{sta_st}	3 ms Max.				Measured from the time \overline{ST} pin crosses 70 % V_{CC}																																														
Start-up time	t_{str}	3 ms Max.				Measured from the time V_{CC} reaches its rated minimum value, 1.62 V																																														
Frequency aging	f_{age}	This is included in frequency tolerance specification.				+25 °C, first year																																														

*1 Frequency tolerance includes initial frequency tolerance, frequency / temperature characteristics, frequency / voltage coefficient, frequency / load coefficient and frequency aging (+25 °C, 1 year).

Pin description

Pin	Name	I/O type	Function	
1	OE	Input	Output enable	High ^{*2} : Specified frequency output from OUT pin Low: Out pin is low (weak pull down), only output driver is disabled.
	\overline{ST}	Input	Standby	High ^{*2} : Specified frequency output from OUT pin Low: Out pin is low (weak pull down), Device goes to standby mode. Supply current reduces to the least as I_{std} .
2	GND	Power	Ground	
3	OUT	Output	Clock output	
4	V_{CC}	Power	Power supply	

*2 Please do not use the OE/ST terminal in the open state.



Product Name

SG-9101CG 170.000000MHz C 20 P H A A A
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

- ① Model ② Package type ③ Frequency
- ④ Spread type ⑤ Spread width
- ⑥ Function ⑦ Operating temperature
- ⑧ Modulation frequency ⑨ Spread profile
- ⑩ Rise/Fall time

② Package type	
CG	2.5 mm × 2.0 mm
CE	3.2 mm × 2.5 mm
CB	5.0 mm × 3.2 mm
CA	7.0 mm × 5.0 mm

④ Spread type	
C	Center spread
D	Down spread

⑤ Spread width		
	Center spread	Down spread
02	±0.25 %	
05	±0.5 %	-0.5 %
07	±0.75 %	
10	±1.0 %	-1.0 %
15	±1.5 %	-1.5 %
20	±2.0 %	-2.0 %
30		-3.0 %
40		-4.0 %

⑧ Modulation frequency	
A	25.4 kHz (Default)
B	12.7 kHz
C	8.5 kHz
D	6.3 kHz

⑨ Spread profile	
A	Hershey-kiss (Default)
B	Sine-wave
C	Triangle

⑥ Function	
P	Output enable
S	Standby

⑩ Rise/Fall time	
A	Default
B	Fast
C	Slow

⑦ Operating temperature	
G	-40 °C to +85 °C
H	-40 °C to +105 °C

External dimensions

(Unit: mm)



Footprint (Recommended)

(Unit: mm)



Notes:

In order to achieve optimum jitter performance, the 0.1 μF capacitor between V_{CC} and GND should be placed. It is also recommended that the capacitors are placed on the device side of the PCB, as close to the device as possible and connected together with short wiring pattern.

PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

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	► Complies with EU RoHS directive. *About the products without the Pb-free mark. Contains Pb in products exempted by EU RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.)
	► Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
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